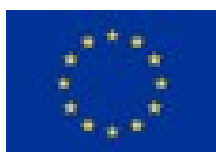




Deliverable 3.2

Joint innovation workshop report

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## Contents

2. Introduction.....	1
3. GEODAYS.....	2
4. CELLE DRILLING Conference.....	2
5. Online Innovation Workshops.....	4
5.1 European Technology & Innovation Platform Deep Geothermal / EGEC.....	4
5.2 Final Joint Innovation Workshop / Pole AveniaAVENIA.....	6
6. Conclusion.....	7

# 1. Introduction

Innovation is a way to constantly improve sustainability of geo-energy industrial projects and was defined as one of the seven core values that unite the GEO-ENERGY EUROPE consortium. Innovation on the geothermal sector relies on a vast number of research, development and innovation initiatives that produce content and do research for the industrial community.

Still, a major barrier to the successful uptake of the knowledge transfer and best practices in this sector is the lack of communication between stakeholders. Building synergies is crucial to the successful internationalization of GEE meta-cluster SMEs, as it allows to integrate the best practices developed by the most recent European industry research and export them as services to target countries or any other international energy market.

To promote synergies between geothermal initiatives and to improve communication of this sector, the GEO-ENERGY EUROPE metacluster proposed the organisation of joint innovation workshops, building on three key partner initiatives meant to boost and orient collaborative innovation, to create favourable conditions to circulate and cross-pollinate industrial experience, research efforts and innovative solutions:

- **Pole AVENIA's GEODAYS**: the only annual event in Europe combining 2 days of exhibition, B2B meetings, conferences & workshops, and since 2019 a space dedicated to open innovation for the subsurface industries.
- The **Celle Drilling Conference**: 2 days for an international conference and exhibition for advanced drilling technology, organized yearly in September by GeoEnergy Celle in Celle, Lower Saxony, Germany.
- The **European Technology & Innovation Platform on Deep Geothermal (ETIP-DG)**, coordinated by EGEC, is an open stakeholder group, endorsed by the European Commission under the Strategic Energy Technology Plan (SET-Plan), with the overarching objective to enable deep geothermal technology to deploy and reach its full potential everywhere in Europe.

Due to Covid-19 restrictions on social events and travelling, the organisation of these events was postponed to the second year of the GEE2 project. One of the main goals was to support the participation of a representative from each of the four target countries: Canada, Chile, Costa Rica, and Kenya, but with the postponing of the *in loco* market visits, the networking between the clusters and European SMEs with the target countries organisations and SMEs were also on stand-by mode, even though GEODAYS and Celle Drilling Conference were held virtually in 2021.

The steps to or attempt to organise, at least, one joint innovation workshop during the second year of the project are described in the next chapters of the present report.

## **2. GEODAYS**

The first joint innovation workshop was scheduled as a joint event GEO-ENERGY EUROPE/GEODAYS workshop, to be organized by partners POLE AVENIA & GEODEEP with the aim to present an overview of the geothermal market and technology or of the training needs of the target third countries, hence identify common innovation subjects of interest and potential future co-developments between European SMEs and the third countries SMEs.

The project had budget to support the presence of a representative/delegate of each of the target countries, and thus giving them the opportunity to benefit from the B2B meetings usually scheduled during the event.

Unfortunately, in 2020, the event was cancelled due to the Covid-19 restrictions. In 2021, the edition of the event was virtual, but Pole Avenia AVENIA included in the programme a presentation of GEE2 project, its progress and main results achieved; this presentation was done by Virginie Schmidlé-Bloch from GEODEEP. In 2022, although the GEODAYS event took place physically, the program did not allow for the inclusion of an innovation workshop as thought and designed by the GEE consortium. It was then decided by the consortium to organise a separate and dedicated session for a Joint Innovation Workshop at later time, if possible as a side event of a geothermal related conference or congress.

## **3. CELLE DRILLING Conference**

In the context of development and implementation of a geothermal project, drilling is considered as the major upfront investment cost, therefore has the most significant leverage effect of money spent in cost reduction effort across the deep geothermal value chain.

The GEE Joint Innovation Workshop, to be co-organized by partners Pole Avenia AVENIA & GeoEnergy Celle, as a side event during the Celle Drilling Conference. The edition predicted to happen in 2020 was postponed/cancelled and in 2021 was an event with virtual attendance.

In 2022, the Celle Drilling Conference took place between the 13<sup>th</sup> and 15<sup>th</sup> of September in Celle, Germany. The programme included drilling subjects such as developing standards for efficient drilling, including well integrity standards, access to an established network of drilling specialists, service companies and testing facilities, education and training of certified personal for drilling and production, long distance transportation of heat without loss in high-tech pipelines, geothermal usage of old oil & gas wells, etc. It would have been the perfect time to do the Joint Innovation Workshop as a side event.

An additional day “on-site” dedicated to the Innovation Workshop was pre-organised. The project had once again a dedicated budget to support the participation of one representative from each target country (Canada, Chile, Costa Rica, and Kenya); for this reason, an invitation to attend the Innovation Workshop on Geothermal Drilling and Production was sent to the target countries representatives.

The proposed program of the Innovation Workshop is described below, the main goal was to promote the sharing of knowledge and the networking between SMEs and the organisations of the target countries.

#### Part 1 – Geothermal markets in target countries and Europe

- Presentation of the geothermal markets of the 4 target countries
- European Geothermal Market
- B2B meetings

#### Part 2 – Presentation of technical papers on geothermal drilling and production:

- Cost-optimized drilling
- German Well Integrity Standards
- Training and Education of drilling crews
- State of the art Drilling Rigs
- Cutting-edge Directional Drilling Technology
- Modern Rock Bits
- High performance electrical submersible pumps
- Long-distance transportation of heat „without loss “

#### Part 3 – Visiting program

- Celle Drilling Simulator
- German Drilling School
- Baker Hughes Test Rig „Beta “

Unfortunately, few answers to the sent invitations were received from the target countries representatives; those who answered were too busy or mentioned that cost of travelling was too high, despite the possibility of the project to sponsor the travel costs from the target country to Germany up to €1,000 for 2 representatives for each target country.

The Celle Drilling Conference was very successful, but the Innovation Workshop was cancelled, it failed to gather representatives and stakeholders from the expected target countries. It was then decided to maximize the potential impacts of such a workshop by organizing it virtually at a time convenient for a maximum of the business clusters, the European SMEs, the target countries representatives and SMEs.

## 4. Online Innovation Workshops

### 4.1 European Technology & Innovation Platform Deep Geothermal / EGEC

The overarching objective of the European Technology & Innovation Platform on Deep Geothermal (ETIP-DG) is to enable deep geothermal technology to deploy and reach its full potential everywhere in Europe. The primary objective is overall cost reduction, including social, environmental, and technological costs. It brings together representatives from industry, academia, research centres, and sectoral associations, covering the entire deep geothermal energy exploration, production, and utilization value chain.

A Joint Innovation Workshop online was organised by EGEC, on September 1<sup>st</sup> 2022, to share the ETIP-DG's Vision and Implementation Roadmap for Deep Geothermal. An invitation was sent to GEE2 partners and SMEs members, as well as representatives from the target countries, to discuss about the rapid transformation of the global geothermal energy industry since countries are building up capacity ever more rapidly, the use of geothermal energy for heating and cooling is rapidly growing, the production of critical raw materials of the energy transitions – such as lithium – is now a major priority of the geothermal sector. As geothermal energy expands globally, growing in its traditional markets and conquering new ones, ETIP-DG also sees the emergence of a global industry where investment priorities and technologies are less bounded by national frontiers, and where innovation drives new technologies development and expands the services geothermal energy can provide.

Therefore, during the workshop, a focus was made on exploring the role of research and innovation (R&I) in the consolidation of a global geothermal industry, looking at R&I and strategic development priorities from notably the US and European market.

The agenda of the event titled “GEO-ENERGY EUROPE Webinar: The role of innovation in the consolidation of a global geothermal industry” is available [online](#) and is described below:

- Introduction, moderation, : *Ana Luisa Lavado, Geological Survey Ireland*
- Presentation of the European research and innovation priorities, *Fausto Batini, ETIP DG Chairman*
- Presentation of the US geothermal vision, *Amanda Kolker, NREL Laboratory Programme Manager*
- International cooperation on R&I: the GEOTHERMICA example, *Alicja Wiktorja Stoklosa, GEORG*
- The Geo-Energy Europe experience in promoting geothermal internationalisation, – *Virginie Schmidlé, AFPG Secretary General, GEODEEP*
- Conclusion

The online event was attended by 198 participants; of whom, 110 were from 19 out of the 27 EU member-states and 88 were from outside EU, including attendees from the four target countries: Canada, Costa Rica, Chile, Kenya.

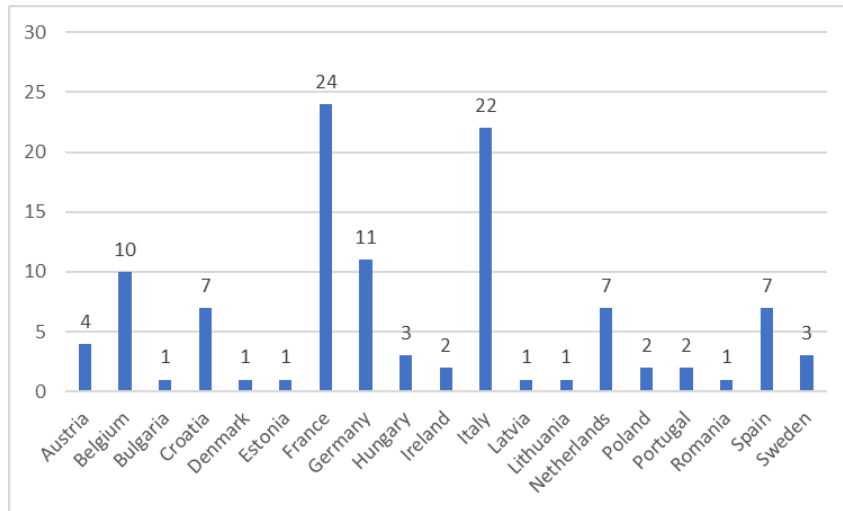


Figure 1: Number of attendees per EU country

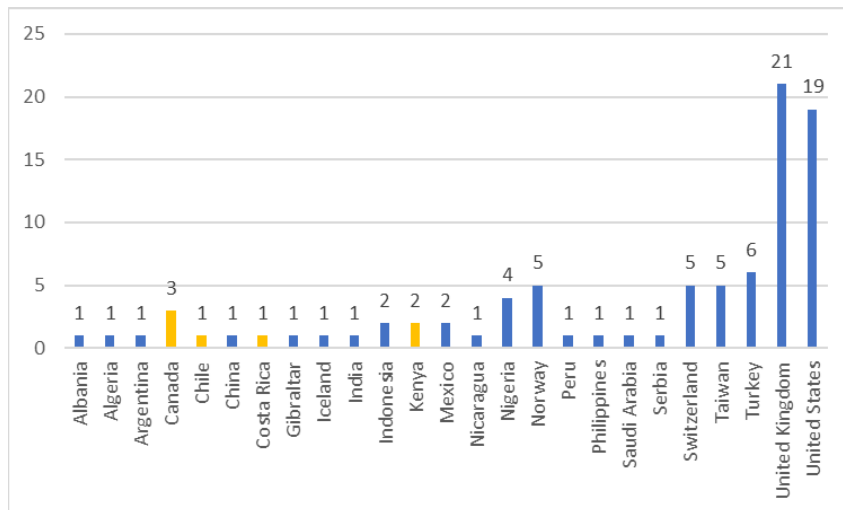


Figure 2: Number of attendees from outside EU, with GEE target countries in yellow

## 4.2 Final Joint Innovation Workshop / Pole AveniaAVENIA

For the last Joint Innovation Workshop, the objective was the presentation of technology innovations by European SMEs, followed by presentation of major development objectives for geothermal energy and/or issues faced by the target countries (Canada, Chile, Costa Rica, and Kenya), with the aim to identify common innovation subjects of interest and potential future developments, cooperations, and collaborations between Europe and target countries. Invitations were sent to all contacts identified and made during the *in loco* Market Visits, or even prior to that when preparing the Training Sessions.

The program of the Joint Workshop is described below:

- Brief introduction of the GEO-ENERGY EUROPE project – Ana-Luisa Lavado
- Interactive session of presentations for collaboration opportunities.
  - **European SMEs** = pitch presentation of what they have to offer to the target countries (Canada, Chile, Costa Rica, and Kenya) in term of technical innovation.
  - **Target countries** = presentation of 2 to 3 of major development objectives for geothermal energy and/or issues they are facing due to technical stoppers.
- Q&A session
- Conclusion and final remarks

The online event happened on October 26<sup>th</sup> 2022, from 4pm to 6:30pm (Paris time). In terms of participation: nine European SMEs volunteered to pitch for 5 to 10 minutes: four from Pole AveniaPole AVENIA, three from CAPES, one from COSVIG, and one from GEODEEP. The SMEs, and their respective presentation title were:

- **Steam Srl (COSVIG)** – Harvesting more power from a geothermal resource: the impact of brine recovery projects on silica scale management
- **Curistec (AVENIA)** – Harvesting Inexhaustible Geothermal Energy Using GeoHeat Closed Loop Technology
- **Deeplime (AVENIA)** – CAGELO, a geothermal cadastre to help the development of geothermal projects
- **Geochem Ltd (CAPES)** – Smart Reservoir Laboratory – a new concept of global petrophysical laboratory service
- **Geolith (GEODEEP)** – Lithium extraction from geothermal brines: a game changer
- **Geort Ltd (CAPES)**- How to make your geothermal heat pump system more effective - with less probe length: choose a good thermal filling material
- **Logframe Ltd & Geowatt Ltd (CAPES)** - Geothermal heating system based on waste heat of thermal wells



- **Openfield Technology (AVENIA)** - Dynamic measurements in geothermal wells using a multisensory approach
- **RealTimeSeismic (AVENIA)** - 3D Frugal Seismic solution for Geothermal projects

Representatives from Chile, Costa Rica and Kenya attended as delegates from the target countries and were listed as speakers with presentations regarding the geothermal potential and respective market in their own country. Canada was unable attend.

- **Chile (CEGA)** - Chilean geothermal context: potential & perspectives for R+D+I programs
- **Costa Rica (ICA)** - Major Geothermal Energy Development Objectives in Costa Rica
- **Kenya (GAK)** - Major Development Objectives for Geothermal Energy and/or Issues Faced by Kenya

The meeting was very successful, with a lot of interactions, questions and discussions among the 49 participants.

## 5. Conclusion

Throughout the project it was necessary to be flexible and to adapt the project work plan to all the social and travelling restrictions imposed by the covid-19 pandemic. The Joint Innovation Workshops were no exemption to all the changes and the most promising ones were online.

The large attendances show that there is a real interest in establishing connexions between European Union countries and target countries, based on innovative and collaborative projects, although these projects need time for networking and time for implementation and development, as well as a focus on internationalisation from the European SMEs and an opening to agreements from the target countries with the European SMEs.